
**HP 28642A HP-PB SCSI
HP 28655A HP-PB SCSI/
Parallel**



HEWLETT
PACKARD

HP 28642A HP-PB SCSI
HP 28655A HP-PB SCSI/Parallel

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Print History

Edition 1, October 1991

Safety Considerations

The product and related documentation must be reviewed for familiarization with safety markings and instructions before installation and operation.

Safety Symbols



Instruction manual symbol. If the product is marked with this symbol, refer to the product manuals to protect the product against damage.

WARNING

A **WARNING** denotes a hazard that can cause personal injury.

CAUTION

A **CAUTION** denotes a hazard that can damage equipment.

Do not proceed beyond a **WARNING** or **CAUTION** notice until you have understood the hazardous conditions and have taken appropriate steps.

Grounding:

The computer in which this product is installed is a safety class I product and has a protective earthing terminal. There must be an uninterruptible safety earth ground from the main power source to the product's input wiring terminals, power cord, or supplied power cord set. Whenever it is likely that the protection has been impaired, disconnect the power cord until the ground has been restored.

Servicing:

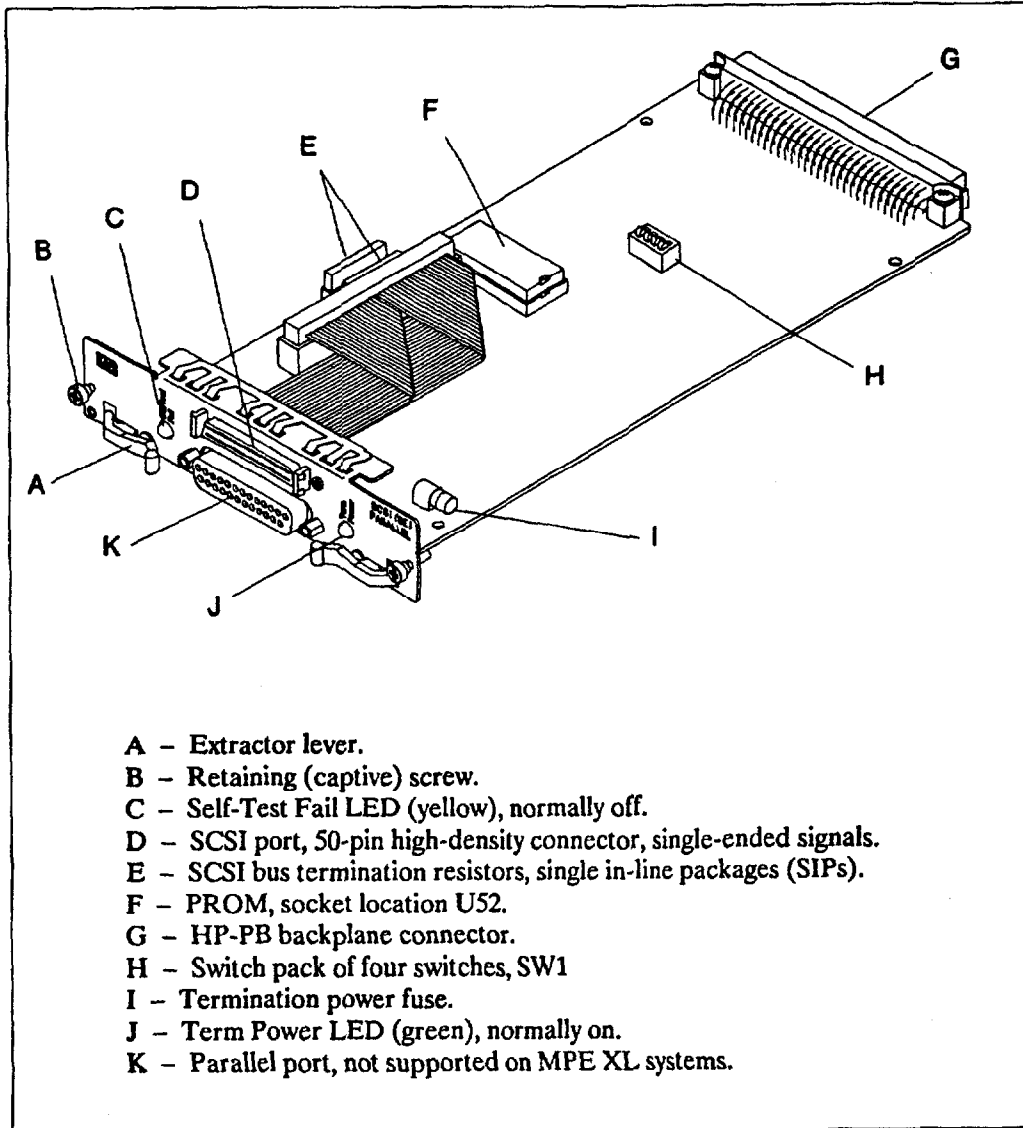
Any servicing, adjustment, maintenance, or repair must be performed only by authorized service-trained personnel.

Hewlett-Packard Company
Roseville Networks Division, Roseville, CA 95678

Installation and Service

HP 28642A HP-PB SCSI
HP 28655A HP-PB SCSI/Parallel

HP 28642A and HP 28655A at a Glance



Product Description

The HP 28642A/HP 28655A HP-PB adapter is a computer interface card for use in Hewlett-Packard computers that use the HP-PB (HP Precision Bus) backplane. The HP 28642A product is for MPE XL systems. The HP 28655A product is for HP-UX systems.

The adapter card provides a SCSI port (Small Computer System Interface) for connecting up to seven SCSI peripherals. In addition, the adapter card provides a standard HP parallel port for connecting an output-only device. The parallel port is not supported for use on MPE XL systems.

Hardware Supplied

HP 28642A*

- SCSI/parallel adapter card (28655-60001)
- SCSI bus external terminator (1252-3920)
- SCSI port cable, 1 meter (5062-3383)
- *This Installation and Service Manual (5960-3126)*

*Note: The parallel port is not supported for use on MPE XL systems.

HP 28655A

- SCSI/parallel adapter card (28655-60001)
- SCSI bus external terminator (1252-3920)
- SCSI port cable, 1 meter (5062-3383)
- Parallel port cable, 2 meter (5180-0010)
- *This Installation and Service Manual (5960-3126)*

Tools and Accessories Not Supplied

- Screwdriver, Torx T-10 or 3/16-inch flat blade
- HP-PB slot divider (5062-3336)
- Loopback hood, single-ended SCSI signals (5061-6565)

In This Book

This manual contains installation and service information for the:

- **HP 28642A HP-PB SCSI adapter for MPE XL systems, and**
- **HP 28655A HP-PB SCSI/Parallel adapter for HP-UX systems.**

This manual is organized as follows:

Chapter 1 provides installation instructions. It describes, in detail, the steps that you should follow to install this product.

Chapter 2 contains service information as well as technical specifications. If you have problems with your card, refer to this chapter for test procedures or general service information.

This manual is limited to installation of the adapter card only. We assume that you have your computer system and peripheral manuals to complete the installation.

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Glossary

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**Installing the
HP 28642A/28655A Adapter**

Installing the HP 28642A/28655A Adapter

This chapter contains installation instructions for the HP 28642A/28655A HP-PB SCSI/Parallel adapter card. Figure 1-1 illustrates a typical installation.

The instructions are organized into the eight primary steps listed below. Each step is described in detail in this chapter. If the adapter card has already been installed and configured at the factory, you may proceed directly to step 5.

1. Prepare to Install the Adapter Card.
2. Shut Down the System and Switch Off the Computer.
3. Check the Card's Hardware Configuration.
4. Install and Connect the Card.
5. Connect Your Peripheral Device(s).
6. Turn Power On to Peripherals, Then to the Computer.
7. Set Up the Operating System.
8. Verify Operation.

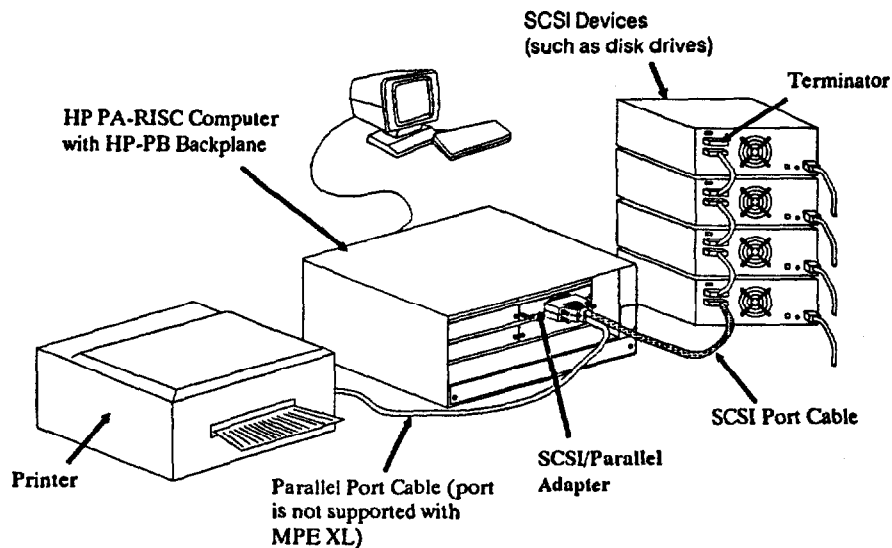


Figure 1-1. Typical Use of the SCSI/Parallel Adapter

1. Prepare to Install the Adapter Card

Before installing the SCSI/parallel adapter card, perform the following:

1. Observe antistatic precautions.
2. Verify product contents.
3. Record adapter card identification information.
4. Gather tools and accessories needed.

Observe Antistatic Precautions

This product contains electronic components that can be damaged by static electricity. To avoid damage, follow these guidelines:

- Store printed circuit assemblies in their conductive plastic bags until you are ready to install them.
- If possible, work in a static-free area.
- Handle printed circuit assemblies only by the edges. Do not touch electronic components or electrical traces. We strongly recommend that you use a grounding wrist strap that is connected to the metallic chassis of the host computer. If you do not have a wrist strap, touch the chassis before handling assemblies and frequently thereafter to equalize any static charge.

Verify Product Contents

Unpack and identify all items supplied with the product:

- | | |
|--|-------------|
| ■ SCSI/parallel adapter card | 28655-60001 |
| ■ External SCSI terminator | 1252-3920 |
| ■ SCSI port cable, 1 meter | 5062-3383 |
| ■ Parallel port cable, 2 meter* | 5180-0010 |
| ■ <i>Installation and Service</i> manual | 5960-3126 |

* Parallel port cable is not supplied with HP 28642A. The parallel port is not supported on MPE XL systems.

Record Adapter Card Identification Information

Should your card require service, its part number and date code may be needed by HP service personnel. This information is provided on a labeled sticker on the card. An example of a labeled sticker is illustrated in figure 1-2.

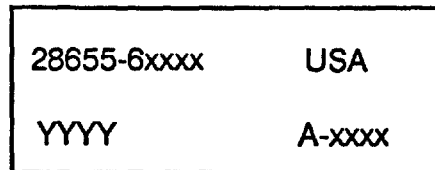


Figure 1-2. Identification Sticker Example

- The number in the upper left (28655-6xxxx) is the adapter card assembly part number.
- The 5-digit alphanumeric string (A-xxxx) is the card version and date code.
- Other numbers (such as YYYY) are for factory use only.

Record the card's part number and date code for future reference. Once the card is installed, this information will be more difficult to obtain.

Gather Tools and Accessories Needed

Check the hardware installation manuals for your particular computer model for any special tools or accessories needed to access the I/O card cage. The following items may be needed for card installation:

- Screwdriver, Torx T-10 or 3/16-inch flat blade.
- Slot divider (5062-3336), described below.
- SCSI cables, described below.

Note

You should have all of your system and peripheral device manuals available for reference. There may be special system or device dependent requirements that are not noted here.

Slot Divider

Since this adapter card is a "single-high" card, it requires a single-high slot (Eurocard standard slot size 3U). A double-high (6U) slot can be converted into two single-high slots using a slot divider. Slot divider installation is described later in this chapter.

This product does not include a slot divider. Slot dividers are normally preinstalled in the computer, and it is unlikely that you will need one. However, if one is necessary, you can order it through the nearest HP Sales and Support Office.

SCSI Cables

SCSI cables may be purchased separately. Table 1-1 lists a variety of Hewlett-Packard cables that can be used with this product, depending on the devices supported with your system. For the most recent information, refer to your system configuration guides, or consult the nearest HP Sales and Support Office.

Table 1-1. SCSI Cables

SCSI Cable Purpose	Cable Product Numbers	Lengths (meters)	Description
Adapter card cable	K2296 K2297	1.0	50-pin, high-density, male connector with thumbscrews (to host adapter), and 50-pin low-density male connector with bail-lock.
		1.5	
Peripheral to Peripheral	92222A	0.5	50-pin, low-density, male connectors with bail-lock on both ends.
	92222B	1.0	
	92222C	2.0	
Extension	92222D C2900A	1.0	50-pin, low-density, female-to-male bail-lock connectors.
		3.0	

2. Shut Down the System and Switch Off the Computer

1. Before installing the card, ensure that the operating system is shut down. Consult your computer system manuals for proper shutdown procedures to avoid corruption or loss of data.
2. Ensure that power to the host computer is off. Unplug the power cord from the power source.

WARNING Unless otherwise noted in your computer system manuals, failure to properly shut down the system and remove power may create a personnel hazard, or may result in hardware damage or data corruption.

3. Check the Card's Hardware Configuration

Hardware settings for the SCSI/parallel adapter apply to the SCSI port only. There are no hardware settings for the parallel port. Figure 1-3 shows the applicable hardware. To check the card's hardware, perform the following:

1. Set the desired parity-checking capability.
2. Set the SCSI bus address.
3. Verify that resistor packs are properly installed.

The SCSI/parallel adapter contains switches for setting the parity-checking capability and the SCSI bus address of the card. The default switch settings are "all switches open", resulting in:

- parity-checking is enabled, and
- SCSI bus address is 7.

In addition, the card contains resistor packs for terminating one end of the SCSI bus.

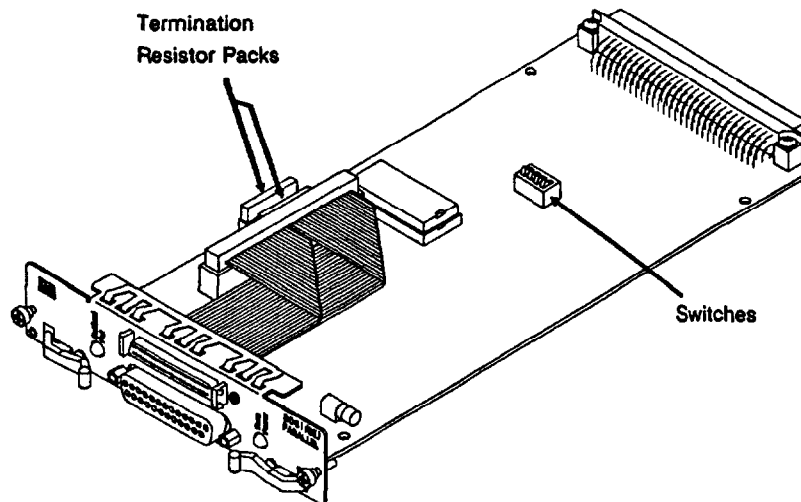


Figure 1-3. Switches and Termination Resistors

Set the Desired Parity-Checking Capability

All devices on a SCSI bus must have the same parity-checking capability. If any device on the SCSI bus does not generate parity, then all devices on the bus, including the adapter, must not check parity. (Although parity-checking is selectable, the adapter always generates parity.)

Note

If there is a SCSI device that cannot match the parity-checking capability of other devices on the bus, you must add a separate SCSI bus for that device. An additional SCSI adapter card may be needed for this purpose.

As shown in figure 1-4, the factory setting is “parity-checking enabled”, that is, with switch 4 in the “open” position. The “closed” position will deactivate parity-checking.

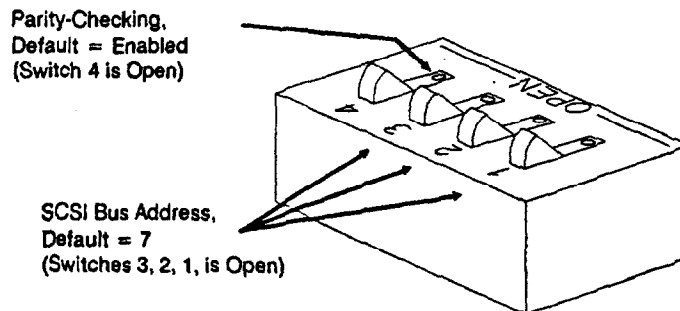


Figure 1-4. Default Switch Settings

Set the SCSI Bus Address

There may be up to eight devices (which includes the SCSI adapter) connected to a SCSI bus. Each device must have a unique address, from 0 to 7. The bus address determines the device's priority on the bus. Seven is the highest priority and zero is the lowest priority.

Switches 3, 2, and 1 are used to set the adapter's address on the SCSI bus. In binary, switch 3 represents the most significant digit. When shipped from the factory, the address is set to 7 (switches 3, 2, and 1 are each set to "1", that is, in the "open" position) as shown in figure 1-4.

For most applications, "7" is the best choice for the adapter's SCSI bus address. Table 1-2 shows switch positions for other possible addresses. Be sure all devices on the bus have a different address.

Table 1-2. SCSI Address Switch Positions

Switch			SCSI Bus Address
3	2	1	
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	0	0	4
1	0	1	5
1	1	0	6
1	1	1	7 (Default)
0 = "closed"			
1 = "open"			

Verify that Resistor Packs are Properly Installed

A SCSI bus has two ends between which SCSI devices are attached. Each end of a SCSI bus must be terminated with a resistor network, or “terminator”. The adapter card contains two resistor packs mounted in sockets on the card. These resistor packs act as a terminator for one end of the SCSI bus.

Note The SCSI port is supported for use only on the end of a SCSI bus. The two resistor packs must be installed.

Visually verify that the two resistor packs are installed with the proper orientation. The resistor packs are marked with a dot on one end and should be oriented as shown in figure 1-5.

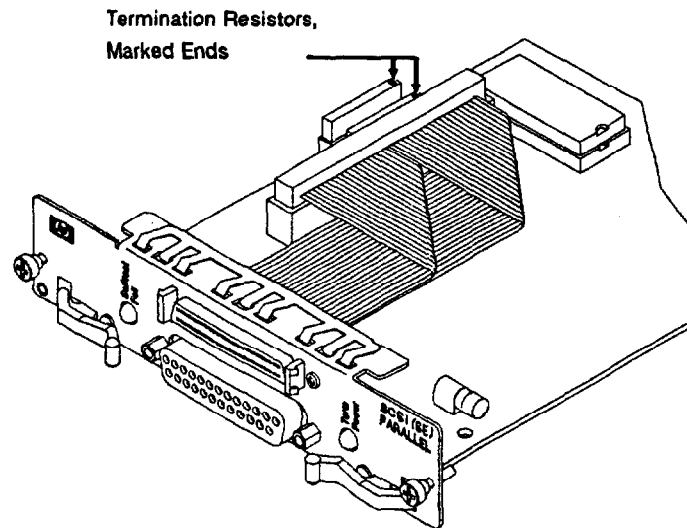


Figure 1-5. Proper Resistor Pack Orientation

4. Install and Connect the Card

The HP-PB cardcage accommodates two sizes of cards: single-high (Eurocard standard 3U) or double-high (6U). The SCSI/parallel adapter is a single-high (3U) card and requires a single-high slot. HP computers are normally shipped with single-high slots. However, this section contains information on converting a double-high slot to two single-high slots.

To install and connect the SCSI/parallel adapter into the host computer, read the steps described below:

1. Select an appropriate slot.
2. Record the slot number.
3. Prepare the slot for use.
4. Insert the card into the slot.
5. Attach the card cables.

Select an Appropriate Slot

Before you install the SCSI/parallel adapter into the host computer, you should understand the following information for your particular computer model:

- **How to gain access to your computer's I/O card slots.**

You may need to remove various covers or panels to expose the slots. If your computer's I/O slots are not readily accessible, refer to your computer installation or hardware reference manuals to gain access.

- **Proper orientation of an I/O card into the cardcage.**

The HP-PB connectors are designed to prevent improper connections.

- **Authorized or recommended slots for the SCSI/parallel adapter.**
 - The SCSI/parallel adapter is a standard HP-PB card. *Typically, it can be installed in any standard HP-PB single-high (3U) slot.* However, some systems may contain special slots that do not support this card, or may contain particular slots that are reserved for this card.
 - The SCSI/parallel adapter complies with HP-PB specifications for a standard-power card. This is indicated on the card by an open circle symbol labeled on the card's faceplate (as illustrated in figure 1-6).

Check your computer installation or hardware configuration manuals for special SCSI/parallel adapter slot requirements.

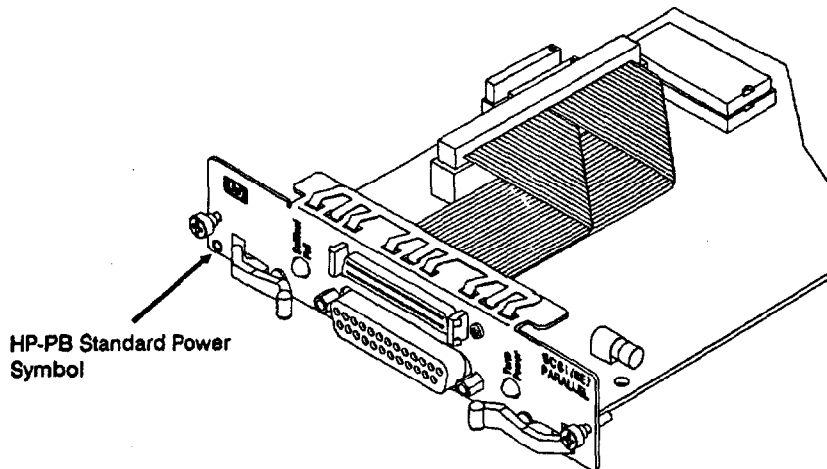


Figure 1-6. Standard Power Symbol Location

- **Computer hardware limitations for I/O cards, if any.**

The HP-UX and MPE XL operating systems support the use of this card. However, the particular computer model into which this card is installed may require special configuration rules due to power supply or slot limitations. This may affect the number or combination of interface cards authorized for use. To prevent card or system damage, be sure to consult your system installation and configuration manuals for authorized I/O card cage configurations.

- **System performance implications, if any.**

All HP-PB I/O cards are guaranteed to be able to acquire the HP-PB backplane for communication with the central processing unit (CPU) or memory. However, the I/O card in the highest numbered slot may acquire the bus more frequently. (That is, if all cards arbitrate for the bus continuously, the card in the highest slot will acquire it about 50% of the time.)

The SCSI/parallel adapter is a high-performance card. In general, if your applications require high performance through this card and you are not concerned about the performance of other I/O cards in your system, then select the highest numbered slot. Otherwise, any other allowed slot would be suitable. You should check your system installation or configuration manuals for any recommended configurations.

Record the Slot Number

The HP-PB slot number is used to calculate the card's hardware address during system configuration. The slot number is labeled on the computer and may be an even or odd digit. Hexadecimal notation may be used. If the slot number will be difficult to obtain once the computer is reassembled, record the number now.

Prepare the Slot For Use

To prepare a slot, you must first remove the metal slot cover. Then, if a plastic filler card is installed in the slot, remove it. (Retain slot covers and filler cards – they should be installed when slots are not in use.) If a slot divider is not installed, you must install one. Figure 1-7 shows the applicable hardware.

Removing Slot Covers

Using a Torx T-10 or 3/16-inch flat-blade screwdriver, unscrew the slot cover retaining screws and remove the slot cover for the selected slot.

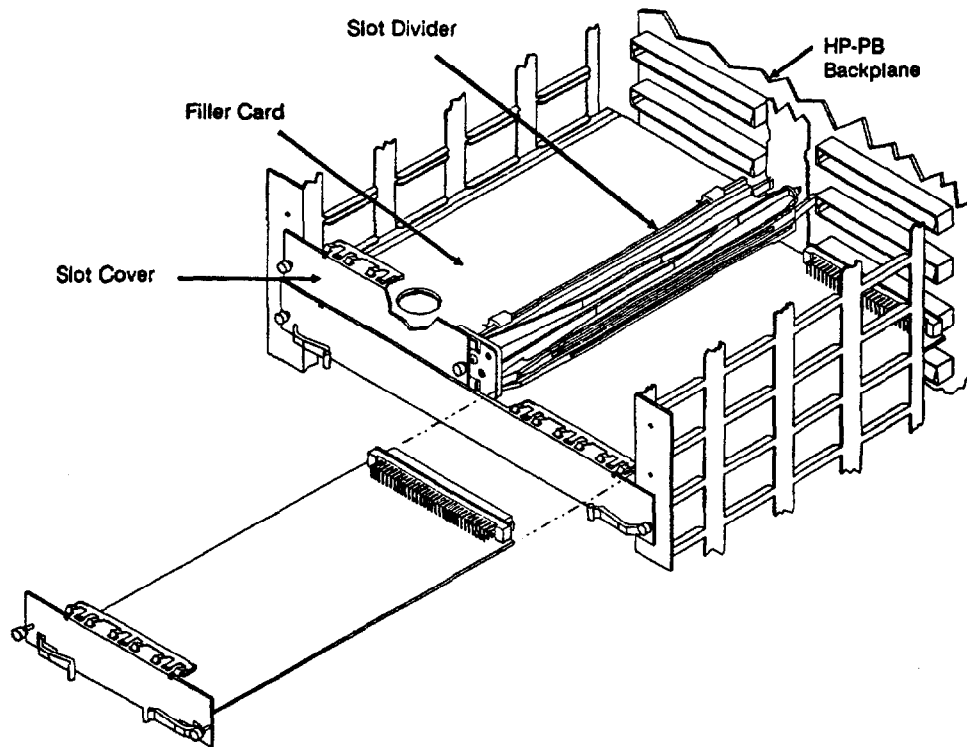


Figure 1-7. Slot Cover, Filler Card, and Slot Divider

Removing Filler Cards

A plastic “filler” card is normally installed when a slot is not in use. In some systems, the filler card helps to channel airflow through the cardcage. In these systems, you must remove the filler card before you can install the SCSI/parallel adapter.

Installing a Slot Divider

A slot divider is an assembly that converts a double-high (6U) slot into two single-high (3U) slots. It provides supporting card guides for single-high adapters and filler cards. It also provides retaining screw holes for securing slot covers and adapters.

Slot dividers are normally pre-installed when shipped from the factory. If a slot divider is already installed, skip the steps below. If a slot divider is not installed, you must install one as follows:

1. Insert the slot divider carefully into the empty double-high (6U) slot.
2. Align the slot divider's alignment pin with the hole in the locator bracket on the backplane. See figure 1-8.

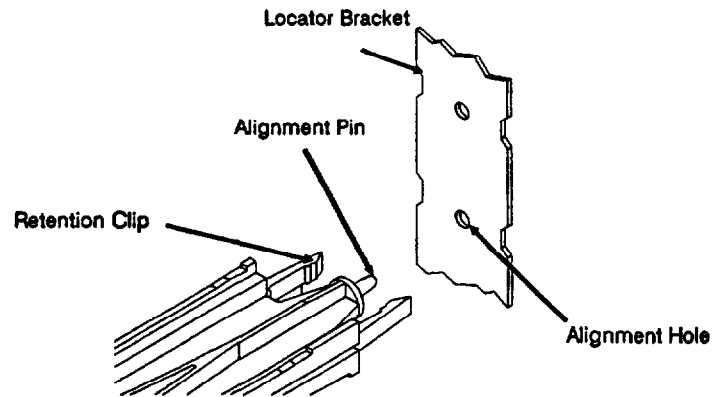


Figure 1-8. Aligning Slot Divider For Installation

3. Press the slot divider until its retention clips clamp onto the locator bracket as illustrated in figure 1-9.

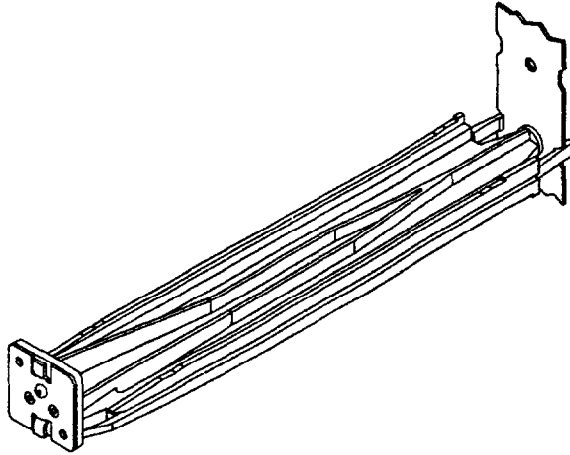


Figure 1-9. Slot Divider Mated With Backplane Bracket

Insert the Card into the Slot

To install the adapter into its slot, proceed as follows:

1. Inspect the 96-pin connector at the back of the slot on the backplane. Ensure that there are no bent pins.
2. With both hands, grasp the card by its edges or faceplate. Do not touch electronic components or electrical traces.
3. Insert the card into the slot. Be sure the card is properly aligned with the card guides on the slot divider and cardcage wall.
4. Ensure that the extractor levers are flush against the faceplate (in other words, not protruding out).
5. Slide the card all the way into the cardcage until it reaches the backplane connector. Be sure that card components are not obstructed in any way.
6. Press firmly on the extractor levers (or on the faceplate) until you feel the card slide fully into place.

CAUTION The use of excessive pressure may damage the card and the backplane. If you feel resistance, check for obstructions, and reverify that the connector pins are straight. Ensure that the card is correctly engaged in the card guides. If the problem persists, get help.

7. Once the card is fully seated in its slot, use a screwdriver to engage and tighten the two retaining screws on the faceplate. These screws secure the card to the cardcage.

Attach the Card Cables

Figure 1-10 shows a typical installation with both the SCSI port and parallel port cables attached (the use of the parallel port is not supported for MPE XL systems).

CAUTION Do not connect serial cables (for example, RS-232 cables) to the parallel port. Connecting serial cables can damage the SCSI/parallel adapter.

Note SCSI cables with high density squeeze-latch or thumbscrew connectors can be attached to the SCSI port. However, cables with thumbscrew connectors are recommended for improved reliability. The SCSI cable supplied with this product provides a thumbscrew connector.

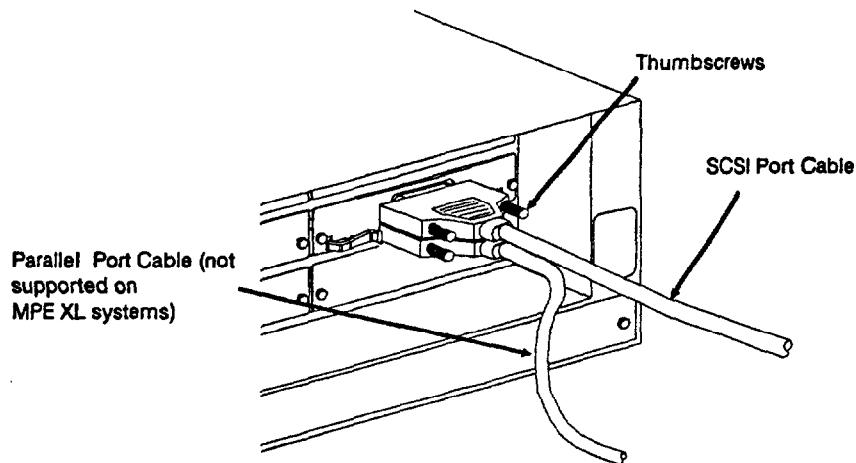


Figure 1-10. Cable Connections to SCSI and Parallel Ports

Connect Your Peripheral Device(s)

You can connect SCSI devices (single-ended devices only) to the SCSI port, and a parallel communication device to the parallel port. (The parallel port is not supported for use on MPE XL systems.) The following steps are described below:

1. Connect your single-ended SCSI devices.
2. Terminate the SCSI bus.
3. Connect your parallel device (if applicable).
4. Reassemble your computer.

Connect Your Single-Ended SCSI Device(s)

When connecting SCSI devices, follow these guidelines:

- Verify that the host system is shut down. There should be no data transfer activity on the SCSI bus.
- Verify that power is off to the peripheral device before connecting it to the SCSI bus.
- Verify that your peripheral devices use *single-ended* SCSI bus signals only.
- Check whether your device contains internal SCSI bus terminators, or requires special terminators. If so, refer to your device manuals for instructions on how to prevent excessive or improper SCSI bus termination.

CAUTION Only the two ends of a SCSI bus should be terminated. Excessive or improper termination may overload the SCSI port's termination power ("TERMPWR") circuitry. This may result in blowing the TERMPWR fuse on the adapter, or damaging transceivers on any attached device (including the adapter). Refer to device manuals to ensure they operate properly on the SCSI bus.

- Set switches or jumpers on your device(s) as appropriate. Be sure each SCSI device has a unique SCSI address.
- For optimum noise immunity, any device that supplies termination power should be enabled to do so. If at least two devices supply termination power, locate them at each end of the SCSI bus.
- Connect the device end of the SCSI port cable (50-pin, low-density SCSI connector) to the first SCSI device. If applicable, connect subsequent devices. The connection method is often called "daisy-chaining". Refer to your device manuals for proper connection to a SCSI bus.
- Use active SCSI terminators.
- Use HP-supplied SCSI cables.
- Minimize the SCSI bus length. However, do not use device-to-device cables that are less than 0.5 meter.
- Do not exceed the maximum single-ended SCSI bus length of 6 meters, which includes the SCSI port cable *and* any internal device cabling. (The SCSI/parallel adapter has an internal SCSI cable length of 0.1 meter.)
- Do not exceed the maximum number of devices supported for your particular system.

Terminate the SCSI Bus

Unless the SCSI bus is properly terminated, the bus will not operate reliably. Terminators provide matching impedance and bias the bus signal lines.

This product includes an external SCSI bus terminator assembly, part number 1252-3920, to terminate the peripheral end of the SCSI bus. The terminator assembly contains a 50-pin, low density, male connector. Adapting connectors can be used to accommodate other types of SCSI connectors. Consult HP for availability.

As illustrated in figure 1-11, install the terminator on the end of the SCSI bus (opposite the SCSI/parallel adapter).

CAUTION

Only the two ends of a SCSI bus should be terminated. Excessive or improper termination may overload the termination power circuitry on the SCSI port. This may result in blowing the TERMPWR fuse on the SCSI/parallel adapter, or may damage transceivers on any attached device (including the adapter). Refer to device manuals for proper device operation on the SCSI bus.

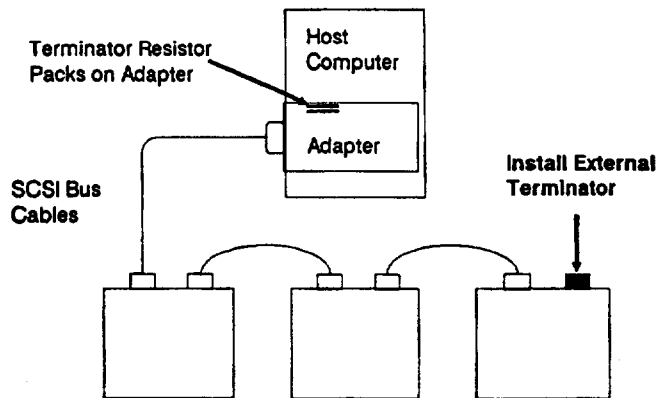


Figure 1-11. Install External Terminator on Last Device

A SCSI Cable Length Example

Table 1-3 and figure 1-12 demonstrate how to calculate SCSI bus cable lengths for a typical installation. The SCSI 0.5 m cable (HP 92222A) used in the example is available through your HP Sales and Support Office. Other lengths are also available.

Table 1-3. Example of SCSI Cable Length Calculation

Starting Point Device	Cable to next device		Internal Cable	Cumulative Cable Length
SCSI host adapter	5062-3383	1.0 m	0.1 m	1.1 m
HP device #1	HP 92222A	0.5 m	0.2 m	1.8 m
HP device #2	HP 92222A	0.5 m	0.4 m	2.7 m
HP device #3	HP 92222A	0.5 m	0.3 m	3.5 m
HP device #4	None		0.4 m	3.9 m
Total		2.5 m	1.4 m	3.9 m

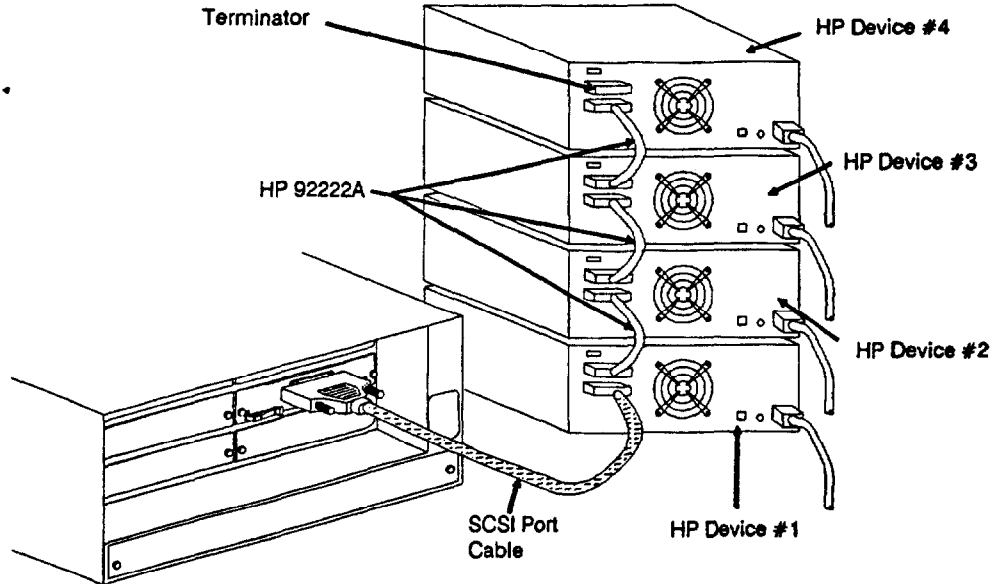


Figure 1-12. SCSI Bus Example

1-22 Installing the Adapter

Connect Your Parallel Device, if Applicable

Output-only parallel devices, such as common printers, can be connected to the parallel port. Figure 1-13 and table 1-4 show the signals definitions of the parallel port connector.

Note For MPE XL systems, do not use the parallel port. The parallel port is not supported for use on MPE XL systems. Proceed directly to step 6, "Turn Power On to Peripherals, Then to the Computer."

The parallel port cable contains a 25-pin connector for connecting to the parallel port, and a 36-pin connector for the peripheral device. Figure 1-14 shows the parallel port cable and wiring diagram.

CAUTION For reliable operation, do not use a parallel port cable that is longer than two meters.

Reassemble your computer

Unless there are other adapter cards to install, reassemble your computer. Be sure to reinstall protective panels or covers.

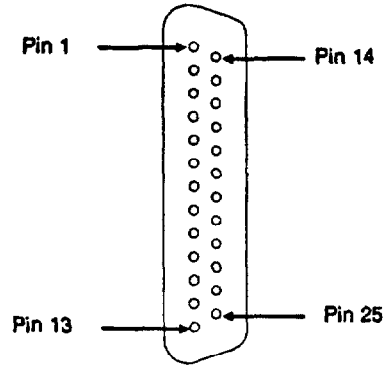
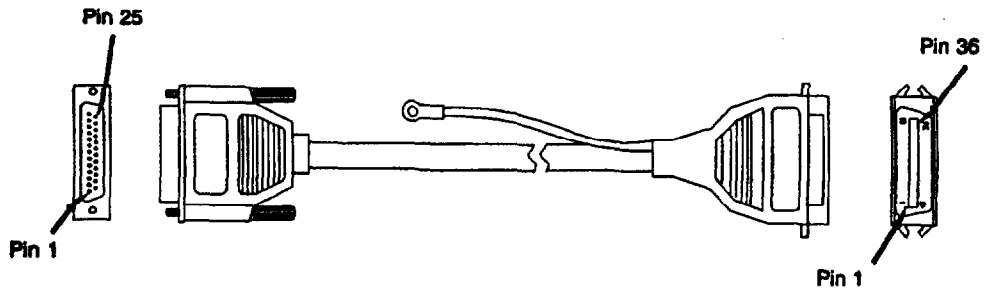


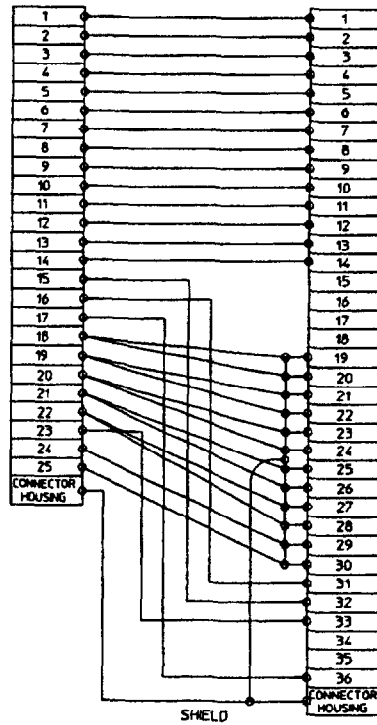
Figure 1-13. Parallel Port Pins

Table 1-4. Signal Pin Assignments

Pin Number	Signal Name	In/Out	Pin Number	Signal Name	In/Out
1	nStrobe	Out	14	nAutoFd	Out
2	Data1	Out	15	nFault	In
3	Data2	Out	16	nReset	Out
4	Data3	Out	17	nSelectIn	Out
5	Data4	Out	18	Ground	
6	Data5	Out	19	Ground	
7	Data6	Out	20	Ground	
8	Data7	Out	21	Ground	
9	Data8	Out	22	Ground	
10	nAck	In	23	no connect	
11	Busy	In	24	Ground	
12	PError	In	25	Ground	
13	Select	In			



25-Pin Connector,
Host End



36-Pin Connector,
Peripheral End

Figure 1-14. Parallel Cable Wiring Diagram

Turn Power On to Peripherals, Then to the Computer

Before turning power on, follow these steps:

1. Verify that all cables are connected and securely fastened.
2. Turn power on to your peripheral devices *before* your computer.

Refer to your peripheral and computer installation manuals for information on turning power on. In general, plug your power cords first into the load (your peripheral or computer), then into the power source (such as the electrical wall outlet). Then turn on your computer power switches as appropriate.

When the computer's power is switched on, power is supplied to the SCSI/parallel adapter through the HP-PB backplane. For operation of the light emitting diodes (LEDs) on the card, refer to chapter 3, *Service Information*.

CAUTION

After power is switched on, termination power ("TERMPWR") is supplied to the SCSI bus. Do not switch power on or off any device connected to an active SCSI bus. Similarly, devices should not be added to, or removed from, an active SCSI bus. Failure to comply may result in data corruption or loss, or damage to hardware.

7. Set Up the Operating System

Before you can use your devices, the SCSI/parallel adapter card and peripheral devices must be configured into the operating system. Depending on your system, this may or may not be performed automatically during the boot process. Refer to your system administration manuals for current procedures.

HP-UX Systems

On HP-UX systems, refer to your *HP-UX Installing Peripherals Guide*, B2437-90005, and *HP-UX System Administration Tasks Guide*, B2437-90006.

If you manually generate a new kernel, you may need the names of the software drivers for the SCSI/parallel adapter card. The driver names are:

- SCSI module: *scsi1*
- Parallel module: *cent0*

MPE XL Systems

On MPE XL systems, refer to your *System Startup, Configuration, and Shutdown Reference Manual*, 32650-90042. On MPE XL systems, you should not need the name of the SCSI module driver.

8. Verify Operation

To verify card operation, observe the light indicators:

- The yellow self-test LED should be off.
- The green termination power LED should be on.

In addition, you can check for proper operation of each port by running one of your application programs that writes to or reads from your peripheral device(s). If proper operation cannot be verified, refer to chapter 2, Service Information, and to your system troubleshooting manuals. If operation continues to fail, call your Hewlett-Packard Sales and Support Office.

2

Service Information

Service Information

This chapter provides the following service and reference information:

- **Field Replaceable Units**
- **Troubleshooting Tools**
- **Removal/Replacement Instructions**
- **Reshipment Guidelines**
- **Technical Specifications**

Field Replaceable Units

Field replaceable units (FRUs) are assemblies or components that are authorized for field replacement. Field replacement of faulty units must be performed by authorized service personnel. See figure 2-1 for FRUs associated with the adapter card.

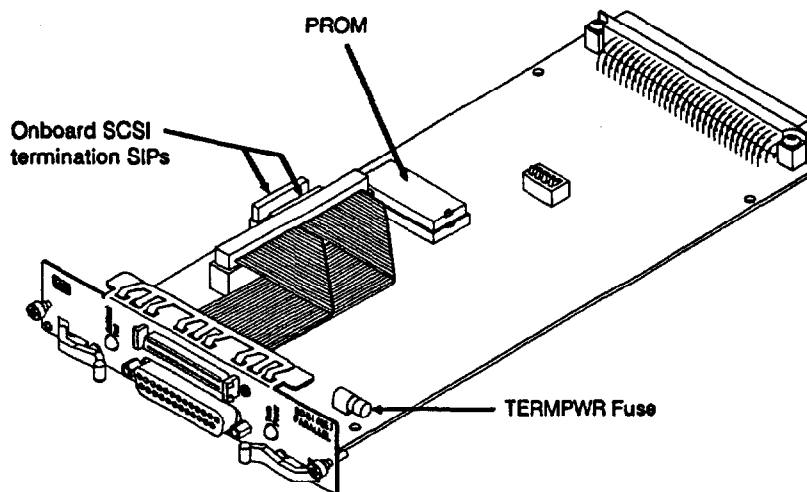


Figure 2-1. Location of Board Component FRUs

Exchange Assembly

The adapter card assembly may be replaced under the HP board exchange program. Assembly part numbers are listed below:

New adapter card assembly:	28655-60001
Exchange adapter card assembly:	28655-69001

Board Components

The following board components are available for replacement (see figure 2-1 for location):

PROM (location U52):	28655-81001
Fuse, termination power:	2110-0517
Onboard SCSI terminator, (single in-line packages, SIPs):	1810-0676 (two installed)

Other FRUs

Other FRUs associated with this product include the following:

SCSI card cable, 1 meter:	5062-3383
External SCSI bus terminator:	1252-3920 (active, single-ended)
Loopback hood:	5061-6565 (single-ended)
Parallel cable,* 2 meters:	5180-0010 (same as HP 92284A)

* Not applicable for the HP 28642A product on MPE XL systems. MPE XL systems do not support the use of the parallel port.

Troubleshooting Tools

Troubleshooting tools are used to identify faulty FRUs. For this product, the following tools are described below:

- Self-Test failure LED (see figure 2-2)
- TERMPWR LED (see figure 2-2)
- *scsipba* and *centpba* diagnostics
- Troubleshooting checklist

CAUTION In some systems, the light emitting diodes (LEDs) on the card may not be visible without exposing the I/O cardcage. Unless otherwise permitted, operating the computer system with the I/O cardcage exposed should be performed by authorized service personnel only.

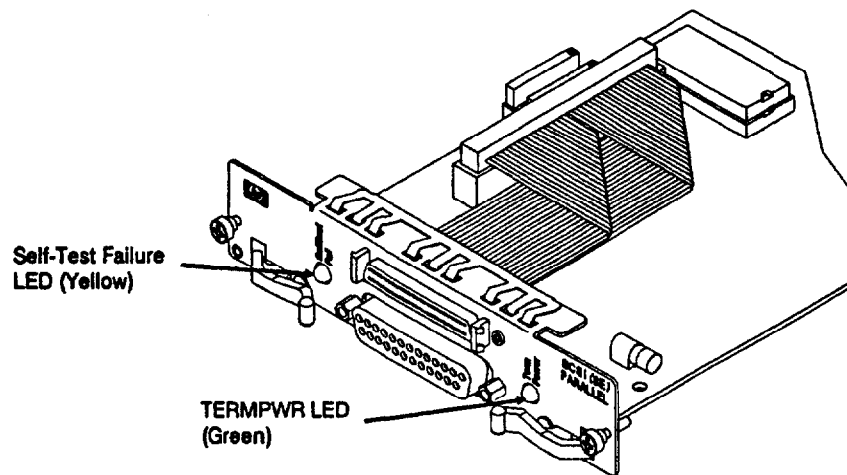


Figure 2-2. Location of LEDs

Self-Test Failure LED

The Self-Test Failure LED is yellow and will indicate card test failures *when used by the host system*. Card self-test code contained in PROM on the card is uploaded to the host and run under host control.

Note

The use of the card's self-test code is system dependent. In some systems, for example, the self-test must be invoked by the operator. In other systems, it may be run automatically by the system, but only if a boot failure occurs.

In addition, the use of the Self-Test Failure LED is system dependent. In some cases, the LED will operate as described here. In other cases, system messages will be displayed on the system console in place of LED operation. Refer to your system reference manuals.

When card self-test is executed, the LED will light and subsequently turn off if self-test passes. When used by the system, the card self-test has failed if:

- the LED never turns on, or
- the LED turns on and remains on.

If card self-test fails, check the TERMPWR fuse. Otherwise, replace the card.

TERMPWR LED

The termination power (TERMPWR) LED is green and indicates that the card is supplying termination power to the SCSI bus. During proper operation, this LED should be on.

If this LED is off, there may be a problem with the TERMPWR circuitry. Possible faults include a blown TERMPWR fuse, a faulty card, or a faulty cable connection. Instructions on how to replace the TERMPWR fuse is described later in this chapter.

SCSIPBA and CENTPBA Diagnostics

Standard diagnostics, *scsipba* and *centpba*, are available for use by authorized service personnel. For more information on these diagnostics, refer to the system troubleshooting and diagnostic manuals for your particular system.

Troubleshooting Checklist

Table 2-1 provides a troubleshooting checklist that can be used to help identify faults.

Table 2-1. Troubleshooting Checklist

Check list item	Explanation
Are all connectors (SCSI and parallel) properly and securely fastened?	Marginal connections can cause improper operation. Ensure that the adapter and retaining screws are completely engaged. Check all cable connections.
Are all the external devices operating correctly?	Run their self-tests and verify their settings.
Does each device on the SCSI bus have a unique address (0 through 7)?	Usually, there will be a set of switches on the device. Conflicting addresses may cause intermittent or complete failures in transmission.
Are SCSI bus length and cable requirements met?	Minimize the SCSI bus length. Do not exceed 6 meters, which includes cable lengths inside each peripheral (the SCSI/parallel adapter's internal SCSI bus length is 0.1 meter). However, do not use device-to-device cables that are shorter than 0.5 meters.
Are you using HP cables?	HP cables are wired to minimize noise.
Do all devices on the SCSI bus have the same parity-checking capability?	If any device on the SCSI bus does not generate parity, no device on that bus may check for it. A mismatch causes non-recoverable hardware errors because parity is both expected and missing. (Note: Only some very early SCSI devices do not generate parity.)

Table 2-1. Troubleshooting Checklist (continued)

Are the SCSI bus terminators correctly installed?	Both ends of the SCSI bus require termination. The terminator on the host adapter is installed at the factory. An external terminator is supplied for terminating the last device on the bus.
Does any device require a special SCSI terminator?	Some external devices may have peculiar termination requirements. The device manual should explain any special termination requirements and how to avoid problems.
Does any peripheral device have an internal SCSI terminator?	Excessive termination may cause damage to the transceivers of all the devices on the bus, including the adapter card, or may cause unreliable operation. Check the device manuals to determine whether they have internal terminators and how to avoid overloading the bus.
Are all devices that can supply termination power configured to do so?	For optimum noise immunity, we recommend that devices be configured to supply TERMPWR when possible. If at least two devices supply TERMPWR, locate them at each end of the SCSI bus. Additional devices that supply TERMPWR can be evenly distributed along the bus.

Removal/Replacement Instructions

This section describes removal and replacement instructions for the following items:

- The SCSI/parallel adapter
- SCSI/parallel adapter components

WARNING Unless otherwise noted in your system manuals, removal of the interface card should only be done with power removed from the host computer. Failure to comply may result in an electrical shock hazard, or in damage to the hardware.

CAUTION The card contains electronic components that can be damaged by static electricity. To avoid damage, follow these guidelines:

- Store printed circuit assemblies in their conductive plastic bags.
- If possible, work in a static-free area.
- Handle printed circuit assemblies only by the edges. Do not touch electronic components or electrical traces. We strongly recommend that you use a grounding wrist strap that is connected to the metallic chassis of the host computer. If you do not have a wrist strap, touch the chassis before handling assemblies and frequently thereafter to equalize any static charge.

Removal/Replacement of the Card

For card removal, follow the procedures below:

1. Before removing the card, ensure that the operating system is shut down and that power to the host computer is off. Consult your computer system manuals for proper shutdown procedures to avoid corruption or loss of data.
2. Access the I/O cardcage according to instructions in your system manuals.
3. Disconnect the cables from the card.
4. Unscrew the two retaining screws that secure the card to the cardcage.
5. Simultaneously lift both extractor levers on the card. This will disconnect the card from the HP-PB backplane connectors.
6. Slide the card out of its slot.

To install a replacement card, follow the procedures described in chapter 1.

Removal/Replacement of Card Components

Replaceable card components are socketed to facilitate their removal and replacement.

PROM and Termination SIPs

CAUTION Observe antistatic precautions when handling these components. When removed from the board, these components should be placed in antistatic containers (such as conductive box 1540-0929 with antistatic foam insert 9211-2794). Minimize touching the connector pins.

It may be necessary to remove Programmable Read Only Memory (PROM) devices and termination resistors for the following reasons:

- The components may be faulty.
- PROMs must be replaced when upgrading to newer versions.

Note The PROM firmware version is displayed during system boot and can also be determined from the *scsipba* diagnostic.

To remove these components, proceed as follows:

1. Remove the card from the host computer as described earlier in this chapter.
2. Use a “chip extractor” or similar tool to gently pry and remove each component from its socket.

CAUTION Excessive prying and pressure can damage the component or its socket. Use care during removal.

To install replacement components, proceed as follows:

1. Identify the proper socket location for the replacement component.
2. Note the half-circle notch or identification mark located on one end of the component. When installed, the component must be oriented so that its notch or mark is in the same direction as a similar notch or mark on the socket.
3. Ensure that the component's contact pins are aligned with the socket's receptacles. You may need to adjust the pins (bow them inward or outward) for proper alignment.
4. Gently press the component into place to properly seat the pins.

CAUTION If pressure is not uniformly applied, the pins on one side or the other may buckle and collapse without making proper electrical contact. If this happens, remove the component, straighten the pins, and try again. If damage was extensive, you may need a new component.

Termination Power Fuse

WARNING For continued protection, replace only with a fuse of the same type and rating.

If the termination power (TERMPWR) fuse blows, the SCSI port will no longer supply termination power to the SCSI bus, and the green TERMPWR LED will turn off.

Note

An open fuse condition can be also be determined from the *scsipba* diagnostic.

If another device on the SCSI bus provides termination power, the bus can continue to operate normally.

Before replacing the TERMPWR fuse, identify the reason for the failure. Check for sources of short circuits on the SCSI bus cables and connectors. Check for proper mating of contact pins on the SCSI bus cables. Be sure that power is off on the host computer and peripheral devices when connecting SCSI bus cables to prevent inadvertent shorting.

To remove and replace the fuse, proceed as follows:

1. Remove the card from the host computer as described previously in this chapter.
2. As shown in figure 2-3, pull the fuse out of its socket. It is usually a good idea to verify that the fuse is open by using a continuity tester.
3. To install the replacement fuse, carefully align the two contact pins with the socket holes. Then simply press the fuse in. The fuse has no polarity, so the pins can go into either socket hole.

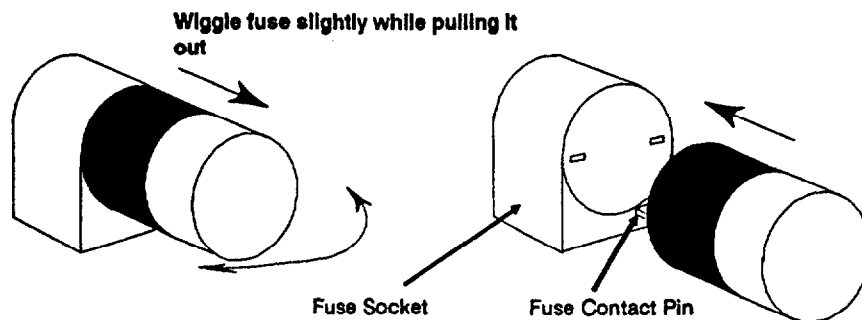


Figure 2-3. Replacing the TERMPWR Fuse

Reshipment Guidelines

If any item of the product is to be returned to Hewlett-Packard for any reason, contact your HP Sales and Support Office to coordinate the return.

When returning any item, attach a tag that identifies the owner and indicates the reason for shipment. Include the part number of the item and date code if applicable.

Pack the item in the original factory packaging material if available, or a suitable substitute. Provide antistatic protection to applicable components or assemblies.

Technical Specifications

Table 2-2. SCSI/Parallel Adapter Technical Specifications

General	Supported Systems	HP 9000 Series 600/800 HP-PB computers (HP-UX); HP 3000 Series 900 HP-PB computers (MPE XL).		
	Standards	SCSI: Complies with X3.131 - 1990 SCSI-2		
	Transfer Rates (supported maximum)	SCSI Synchronous:	5.0 Mbytes/second	
		SCSI Asynchronous:	3.0 Mbytes/second	
		Parallel Asynchronous:	330 Kbytes/second	
	Status LEDs	Self-test failure (yellow)	Under host computer system control	
		Termination power (green)	Turns off if TERMPWR fuse opens	
	Port Connectors	SCSI: High-density 50-pin female		
		Parallel: Subminiature D 25-pin female		
	SCSI Bus	Signal type: Single-Ended (SE)		
		Data bus width: 8 bits, plus 1-bit parity		
SCSI length on PCA: 0.1 m (SCSI port cable is 1.0 m)				
	Supported SCSI bus length: 6 m maximum (includes any internal lengths in all devices)			
SCSI mode	Initiator only			

Table 2-2. SCSI/Parallel Adapter Technical Specifications (continued)

Electrical	Voltage	Current (Typical)		Power (Typical)	
	+5 Vdc	0.75 A		3.75 W	
	+12 Vdc	0 A		0 W	
	-12 Vdc	0 A		0 W	
Physical		Length	24 cm (9.4 in)		
		Width	13 cm (5.1 in)		
		Thickness	3.1 cm (1.2 in)		
		Weight	0.26 kg (9 oz)		
Environmental		Operating	Temperature	0°C to 55°C	
			Relative Humidity	15-95% @ 40°C (noncondensating)	
			Altitude	4.6 km (15,000 ft)	
		Non-Operating	Temperature	-40°C to 70°C	
			Relative Humidity	90% @ 65°C	
			Altitude	4.6 km (15,000 ft)	
		Electro-magnetic	When operating under authorized conditions, complies with FTZ-1046 (VDE Level B), VCCI Class 1, CISPR-22 Class A, and FCC Class A for radiated and conducted emissions.		

Glossary

adapter, adapter card

An add-on computer interface card and circuitry that provides the physical connection and data translation between the host computer's I/O bus and external devices or networks.

ANSI

American National Standards Institute.

backplane

For an I/O bus, the computer's circuitry and connectors to which adapter cards connect. The SCSI/parallel adapter card is supported on HP Precision Architecture RISC computers that use the HP-PB backplane. See also, **HP-PB**.

balanced signal

See **differential signal**.

bus

The electrical hardware and circuitry for transferring data, address and control signals between hardware modules or devices.

configuration

The arrangement of a computer system or subsystem and its elements to allow proper operation or to implement specific functionality. The term configuration may refer to both hardware and software.

console

The ASCII terminal, or personal computer emulating an ASCII terminal, that is connected to the host computer for system administration (such as for configuration, monitoring and troubleshooting).

device

In this manual, refers to the peripheral units that are attached to the SCSI/parallel adapter card.

device adapter

See adapter.

differential signal

Also referred to as “balanced signal”. During electrical transmission and reception, signals are determined by the difference between two lines that are both at different voltages relative to ground. Differential SCSI signals can be used over longer distances and at higher data rates. A differential SCSI bus is incompatible with a single-ended SCSI bus. Therefore, differential SCSI devices may not be used with the SCSI/parallel adapter card. See also, single-ended signal.

filler card

In some HP-PB computers, a removable plastic plate that is installed in HP-PB I/O slots when the slot is not in use.

FRU

Field Replaceable Unit. The lowest level of hardware supported for field replacement, such as to effect repair.

hardware path

The collection of hardware addresses that uniquely identify hardware elements (such as adapter cards and peripheral devices) to the computer system.

high-density connector

In reference to the adapter card's SCSI port, a 50-conductor connector consisting of two rows of 25 contacts with adjacent contacts 1.27 mm (0.05 in) apart. See also, low-density connector.

host

In this manual, the computer in which the adapter card is installed.

host adapter

See adapter.

HP-PB

Hewlett-Packard Precision Bus. The data, control, and addressing signal lines for input/output operation on Hewlett-Packard PA-RISC computer systems. HP-PB is the 32-bit system-architected bus through which the CPU, memory, and input/output adapter cards communicate.

HP-PB card

See adapter.

interface card

See adapter.

I/O

Input/Output. The computer subsystem through which data communications with external devices is performed.

IODC

I/O Dependent Code. In PA-RISC computers, IODC is ROM-based firmware on an adapter card that is used for supplying card-dependent information to the host computer. This code may contain test routines that check operation of the card.

LED

Light Emitting Diode, a semiconductor component that emits light when electrically activated to serve as an indicator of operation or state.

loopback

Generally, the process of transmitting known data, and comparing received data with expected results (normally used during troubleshooting, test, or verification procedures).

loopback hood

A special connector with signal lines configured to allow loopback testing of the adapter card.

low-density connector

In reference to the SCSI bus, a 50-conductor connector consisting of two rows of ribbon contacts spaced 2.16 mm (0.085 in) apart. See also, **high-density connector**.

parallel port

The 25-pin connector on the SCSI/parallel adapter card for 8-bit parallel data communications with an output only device, such as a printer.

PA-RISC

Hewlett-Packard's Precision Architecture Reduced Instruction Set Computing computer systems.

parity

A method to check that data was accurately transmitted and received. Usually, the transmission logic sums the transmitted data unit and, based on the summation, appends a parity bit. The receiver logic sums the received data unit and, based on its summation, compares the parity bit. The adapter card's SCSI port can have its parity-checking ability enabled or disabled.

Precision Bus

See **HP-PB**.

SCSI

Small Computer System Interface, often pronounced "skuzzy". Refers to both **SCSI-1** and **SCSI-2**.

SCSI-1

Complies with the SCSI specification X3.131 - 1986.

SCSI-2

Complies with the SCSI specification X3.131 - 1990. SCSI-2 provides extensions and further standardization of SCSI-1.

SCSI address

The octal representation of the unique address (0 to 7) assigned to each device on an SCSI bus. For bus arbitration, higher addresses have priority over lower addresses. SCSI addresses are typically assigned during installation. The host adapter is typically assigned "7".

SCSI bus

The collection of unbroken SCSI signal lines that interconnect SCSI devices

SCSI ID

SCSI identification. The bit-significant representation of the SCSI address referring to one of the bus signal lines DB (7 through 0). See also, SCSI address.

self-test

A diagnostic test to check hardware components and circuitry.

slot divider

An assembly used to convert a double-high (6U) HP-PB I/O slot into two single-high (3U) slots. Also referred to as a "two-board adapter".

single-ended signal

Also referred to as "unbalanced signal". During electrical transmission and reception, signals are determined by the voltage of a single line relative to a common ground. Because of electrical noise caused by ground loops at even short distances (common mode noise), single-ended SCSI signals are limited to 6 meters maximum and lower data rates. A single-ended SCSI bus is incompatible with a differential SCSI bus. Therefore, use only single-ended SCSI devices with the SCSI/parallel adapter card. See also, differential signal.

system administrator

The person who manages or controls the configuration and operation of a computer system.

terminator

An assembly that contains a resistive network to terminate the peripheral end of a SCSI bus. The peripheral end of the SCSI bus may not need a terminator if the last peripheral device on the bus already contains SCSI termination resistors.

termination

To complete the bus circuitry at each end of a SCSI bus, the electrical lines (at each end only) must be terminated with a resistive network. The HP-PB SCSI/parallel adapter contains termination resistor packs on the card and must be located at one end of the SCSI bus. See also, terminator.

two-board adapter

See slot divider.

unbalanced signal

See single-ended signal.

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